



## Unlocking Western Sydney's Potential with Light Rail

Western Sydney Light Rail Network  
Part 2 Feasibility Report

AUGUST 2013



**PARRAMATTA**  
FUTURE GENERATION

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This report has been prepared with the support of:



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# FOREWORD



It is my pleasure to release Part 2 of the Western Sydney Light Rail Network Feasibility Report.

This report follows the release of Part 1 in May 2013, which identified the preferred first stage of the Network comprising two lines from Parramatta; one to Castle Hill and the other to Macquarie Park. This is the start of a Light Rail Network that will grow and evolve to meet the future economic and social needs of Western Sydney, with future lines to Bankstown and Rhodes via Sydney Olympic Park already identified.

Part 2 of Council's study further investigated the first stage lines in terms of transport and land use. We undertook an initial engineering feasibility and identified preferred alignment and stops as well as refined the cost. We also investigated the land use change potential to accommodate population and employment growth that could be anticipated as consequence of the Network.

This document strengthens the case for the Western Sydney Light Rail network. Council is now calling on both State and Federal Governments to fund the next stage study including a detailed business case.

It is a question of when this network will be built, not if. Parramatta and Western Sydney are growing and need better public transport to support the growth of the region and a future generation of Sydney-siders.

A handwritten signature in black ink, reading 'J. Chedid' with a stylized flourish underneath.

**Cr John Chedid**  
Lord Mayor of Parramatta



# OVERVIEW

## FIRST STAGE OF THE NETWORK







Parramatta City Council has undertaken the Western Sydney Light Rail Feasibility Study to address the challenges of a growing Western Sydney region.

In Part 1 of the study (see separate document), Council with the support of consultants undertook five separate but integrated studies focussed on transport, land use, environmental, economic and health and social areas to design a Light Rail Network and identify a preferred first stage scheme.

Lines to Macquarie Park and Castle Hill emerged as the most feasible two alignments.

Part 2 of the study, this document, further investigated the two lines.

The central section of the first stage is common to both lines and covered in detail (pages 8–9). The eastern section, Rydalmere to Macquarie Park (pages 10–11) and northern section, North Parramatta to Castle Hill (pages 12–13) is also covered in detail.

The study recommends that the Macquarie Park Line be constructed before the Castle Hill Line. The revised cost for both lines is \$1.525b for 30km including a depot and 21 light rail vehicles to operate a service every 10 minutes on both Lines.

# OVERVIEW

## FEASIBILITY STUDY

### Objectives

Parramatta City Council instigated the \$1m Western Sydney Light Rail Feasibility Study to gain a better understanding of how light rail could advance the following regional priorities:

- > **Economic** – increase economic productivity
- > **Lane Use** – accommodate residential growth and stimulate employment growth
- > **Transport** – provide greater transport options to Parramatta and across the region
- > **Social and health** – improve social disadvantage and quality of life for all residents.

### Part 1 of Study

Part 1 of the study identified 15 strategic transport corridors within 15 km of Parramatta and assessed them for their potential to address the challenges of the region.

A series of multi-criteria gateway assessments were undertaken to filter and refine corridors to identify the preferred network of four lines and first stage of two lines (see map below).

Part 1 concluded that light rail was feasible along the alignments considered and investment in light rail will significantly transform the social, economic and physical function of Western Sydney.

### Part 2 of Study

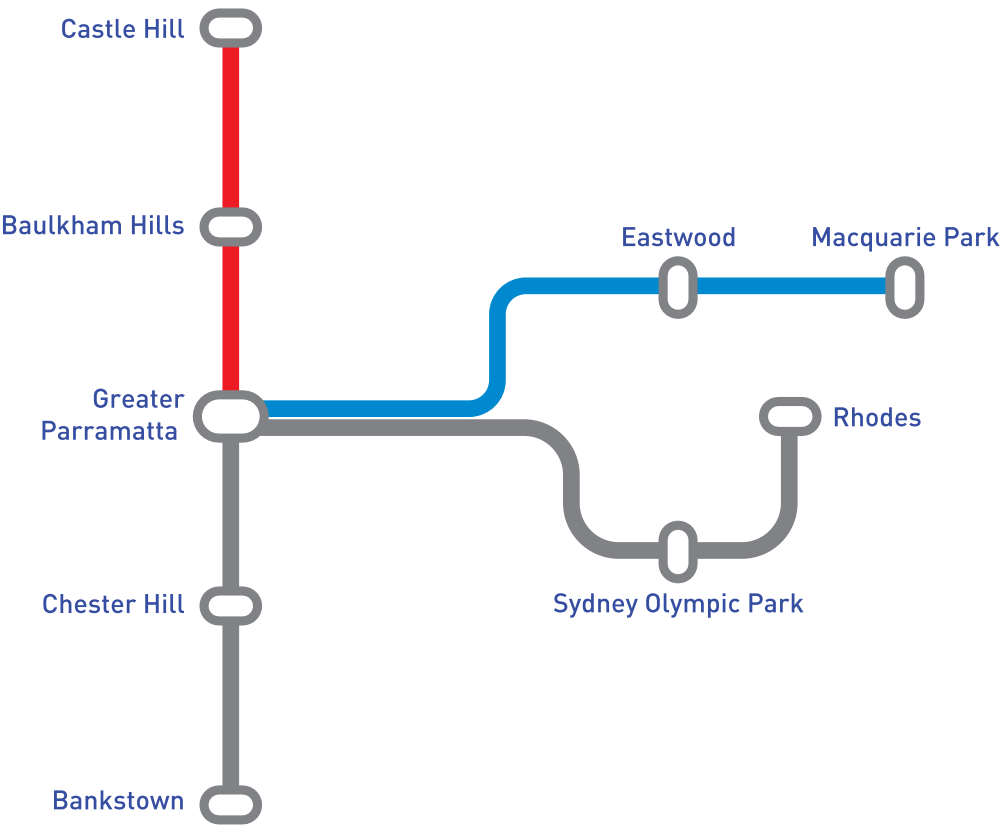
Part 2 of the study, this document, is a more detailed transport and land use analysis of the proposed first stage of two lines.

It includes an initial engineering assessment, potential land use change and urban renewal opportunities with potential dwelling and job numbers and refinement of capital costs including staging.

The study demonstrates how light rail will change the urban form along an alignment and activity centre, and how it contributes to urban renewal, particularly where underutilised and less accessible neighbourhoods are transformed into desirable and attractive places.

### Proposed Western Sydney Light Rail Network

- Key
- First Stage  
**Macquarie Park Line**
  - First Stage  
**Castle Hill Line**
  - Future Stages



# LIGHT RAIL IN WESTERN SYDNEY

## What is Light Rail?

The terms tram and light rail are often used interchangeably.

Light rail in this study refers to a system predominately operating in a segregated alignment with less frequent stops and higher average speeds than local bus services.

A 'tramway' is an on-street rail system operating in shared traffic conditions and resembling a local bus service with frequent stops and a slower speed.

Tram is also used for an older style of vehicle with less capacity and less accessibility whereas light rail vehicle is used to describe its modern cousin.

## Role of Light Rail in the region

The Western Sydney Light Rail Network will help build a new city at Parramatta; changing the structure of Greater Sydney from a mono-centric to a poly-centric model.

The Network also connects Parramatta to the major economic centres of the region, and these centres to each other. It provides new access and opportunity to the residents, business owners, commuters and students of Western Sydney, helping to unlock the social and economic potential of the region.





# GREATER PARRAMATTA

## WESTMEAD → PARRAMATTA → RYDALMERE

### Route Description

This section focuses on the route through Greater Parramatta, the core of the network. The route between North Parramatta and Rydalmere is common to both lines while the North Parramatta to Westmead section is part of the Macquarie Park Line.

From Westmead Station the light rail operates in segregated lanes in the centre of Hawkesbury Rd. Through Cumberland Hospital the route shares the road with limited traffic. Church St then reallocates the road space from buses to light rail with segregated lanes in the centre of the road. From Riverside Theatres the light rail shares the road with limited traffic.

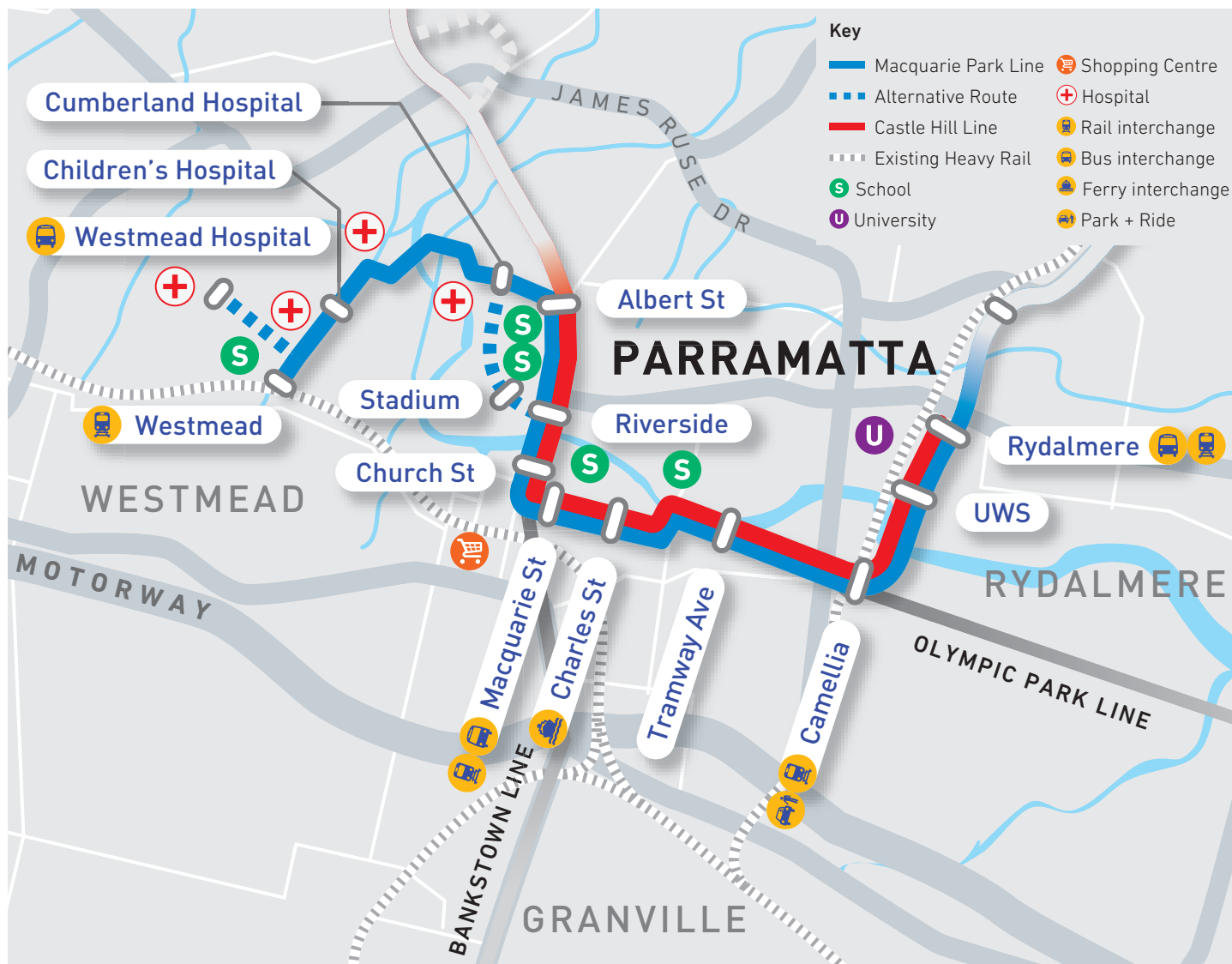
Macquarie St has two segregated lanes for light rail. The route through Harris Park uses a combination of segregated lanes (road corridor widening) and lightly trafficked roads. The line passes under James Ruse Drive where a road flyover is constructed as part of the Western Sydney Regional Ring Road. The line parallels the Carlingford Line between Camellia and Rydalmere on a dedicated right-of-way.

### Connections

#### The Greater Parramatta section of the network connects:

- Westmead Medical Precinct including the Cumberland Hospital
- North Parramatta with Parramatta Stadium and Riverside Theatres
- Parramatta CBD, a regional city with significant employment and large retail services presence
- Harris Park local centre
- Camellia with access to Rosehill Racecourse
- Rydalmere including University of Western Sydney





## Westmead → Parramatta → Rydalmere

### Stops

Within this section 17 stops were investigated and 12 preferred stops were identified (see route map) on the preferred alignment, along with interchange opportunities and destinations.

### Key Benefits

- > Increases accessibility for people and business across Greater Parramatta
- > Connects residential areas with jobs, education, health, recreation and culture
- > Supports new developments both residential and employment in the Parramatta CBD

- > Drives urban renewal in the north and south of the Parramatta CBD
- > Establishes the core of a Western Sydney Light Rail Network

### Alternative Routes

A route via Parramatta Stadium was considered and would offer a direct connection to the venue. However, a route along Church St avoids duplicate infrastructure and still serves Parramatta Stadium, as well as strengthening Church St as the city's spine.

### Future Lines

The light rail is planned to expand over time. A Bankstown Line would continue south along Church St and Woodville Rd. An Olympic Park Line would

continue eastward from Camellia along the existing transport corridor with a new crossing of Duck River.

### Depot and Operations Centre

Camellia has been identified as the site of a potential depot and operations centre which can serve both lines and the future network.

### Challenges to be managed

- > CBD traffic and bus management
- > Pedestrian safety
- > Land availability
- > Future of the Carlingford Line



# MACQUARIE PARK LINE

## RYDALMERE → MACQUARIE PARK

### Route Description

The Macquarie Park Line connects Westmead to Macquarie Park via Parramatta, Rydalmere, Dundas and Eastwood. This section focuses on the route between Rydalmere and Macquarie Park.

From Rydalmere the light rail will parallel the Carlingford Line to Dundas on a dedicated right-of-way and then use segregated lanes in the centre of Kissing Point Rd. The line crosses Brush Farm Park with a viaduct limiting the impact on the environment. The County Rd freeway reserve is utilised with segregated lanes in the centre of a widened Rutledge St.

Rowe St is the preference through Eastwood on a shared road with limited traffic. The line then uses the County Rd freeway reserve through Marsfield with a dedicated right-of-way mainly. Herring Rd leads to the regional shopping centre in Macquarie Park and uses a combination of shared and segregated lanes.

### Connections

#### The Macquarie Park line connects:

- Westmead, Parramatta, Harris Park, Camellia and Rydalmere (see Greater Parramatta section)
- Dundas local centre
- Telopea
- Eastwood town centre
- Marsfield
- Macquarie Park including business parks, Macquarie University and large shopping centre







## Rydalmere → Macquarie Park

### Stops

This section investigated 11 stops and identified 9 preferred stops (see route map) on the preferred alignment, they are shown on the route map, along with interchange opportunities.

### Key Benefits

- > Provides a direct public transport connection between Greater Parramatta and Macquarie Park
- > Connects residential areas with jobs, education and recreation
- > Opportunities for urban renewal
- > Makes use of land reserved for transport

### Alternative Routes

An alternative route through Eastwood along First St was considered. This route is direct but the route along Rowe St better serves the rail station and town centre.

### Carlingford Rail Line

The light rail proposal assumes the Carlingford Line continues to operate. The future of the line is a State Government matter, however, converting the line between Camellia and Dundas to light rail reduces the cost of the Macquarie Park Line.

### Challenges to be managed

- > Future of the Carlingford Line
- > Crossing Parramatta River
- > Environmental impact on Brush Farm Park
- > Impact on existing bus services and traffic, especially within Macquarie Park

# CASTLE HILL LINE

## NORTH PARRAMATTA → CASTLE HILL

### Route Description

The Castle Hill Line connects Rydalmere to Castle Hill via Parramatta, Northmead and Baulkham Hills. This section focuses on the route between Albert St North Parramatta and Castle Hill.

From Albert St North Parramatta to Northmead the light rail travels in segregated lanes in the centre of road utilising existing bus lanes. There is road reserve along Windsor Rd to Baulkham Hills which allows for the centre lanes to be used for light rail and the road to be widened to maintain four traffic lanes.

The route from Coronation Ave to Showground Rd is either located in the centre of the road, or on one side to manage the impact on turning traffic at intersections and the topography of Carrington Rd.

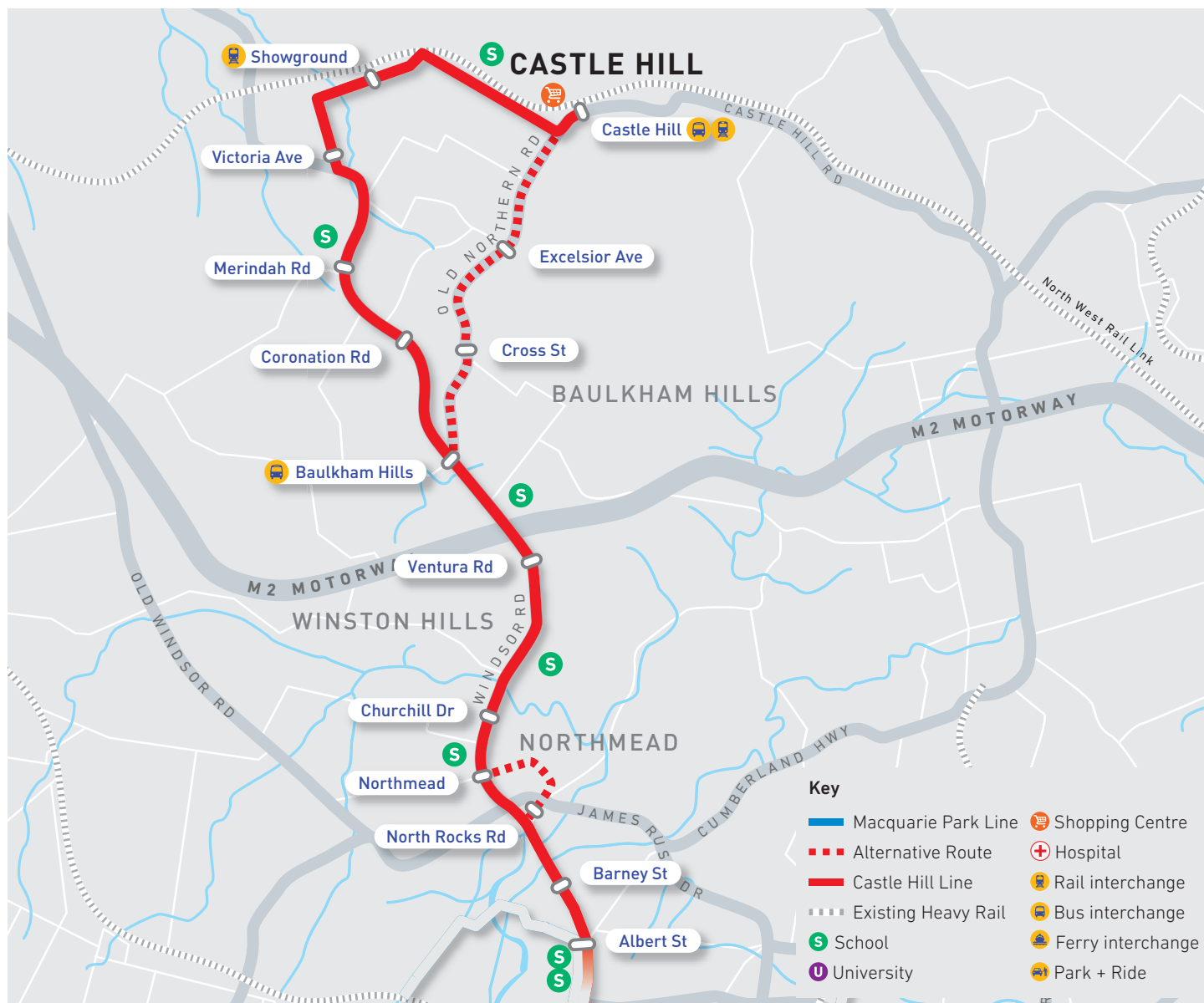
The approach to Castle Hill is along Showground Rd where there is land reserved for road widening. There is scope for two light rail lanes and four traffic lanes where there are currently just two traffic lanes.

### Connections

#### The Castle Hill Line connects:

- Parramatta, Harris Park, Camellia and Rydalmere (see Greater Parramatta section)
- North Parramatta
- Northmead
- Baulkham Hills
- Castle Hill Trading Zone
- Castle Hill with large shopping centre





## North Parramatta → Castle Hill

### Stops

This section investigated 14 stops and identified 10 potential stops on the preferred alignment (see route map), with interchange opportunities and destinations.

### Key Benefits

- > Provides a direct public transport connection between Greater Parramatta and Castle Hill
- > Interchange to two North West Rail Link stations, increasing access to the growing northwest
- > Enhances north-south regional connectivity across Western Sydney

- > Connects residential areas with jobs, education and recreation
- > Opportunities for urban renewal

### Alternative Routes

An alternative route along North Rocks Rd was investigated to avoid the congested intersection of James Ruse Dr and Windsor Rd, however on balance it is considered the direct route with a widened intersection is a better solution for both road traffic and light rail, and avoids steeper gradients.

Crossing the M2 represents another significant engineering and traffic challenge.

Old Northern Rd is the direct route to Castle Hill but there is limited scope to widen the road, compared with Windsor Rd. In addition Windsor Rd has more trip generators due to the Castle Hill Trading Zone.

### Challenges to be managed

- > Crossing James Ruse Dr and the M2
- > Impact on existing bus services and traffic congestion, especially within Castle Hill
- > Widening Windsor Rd between Northmead and Baulkham Hills



**CASTLE HILL TRADING ZONE**

	House	Briefcase
2011	0	9000
2031	0	12,500
2061	0	19,800

**CASTLE HILL**

	House	Briefcase
2011	540	7900
2031	1018	12,200
2061	2370	16,500

**CASTLE HILL CORRIDOR**

	House	Briefcase
2011	19,110	16,200
2031	26,491	19,400
2061	40,762	22,240

**BAULKHAM HILLS**

	House	Briefcase
2011	15	1300
2031	261	1800
2061	1652	2800

**WESTMEAD**

	House	Briefcase
2011	268	12,800
2031	433	19,900
2061	833	36,400

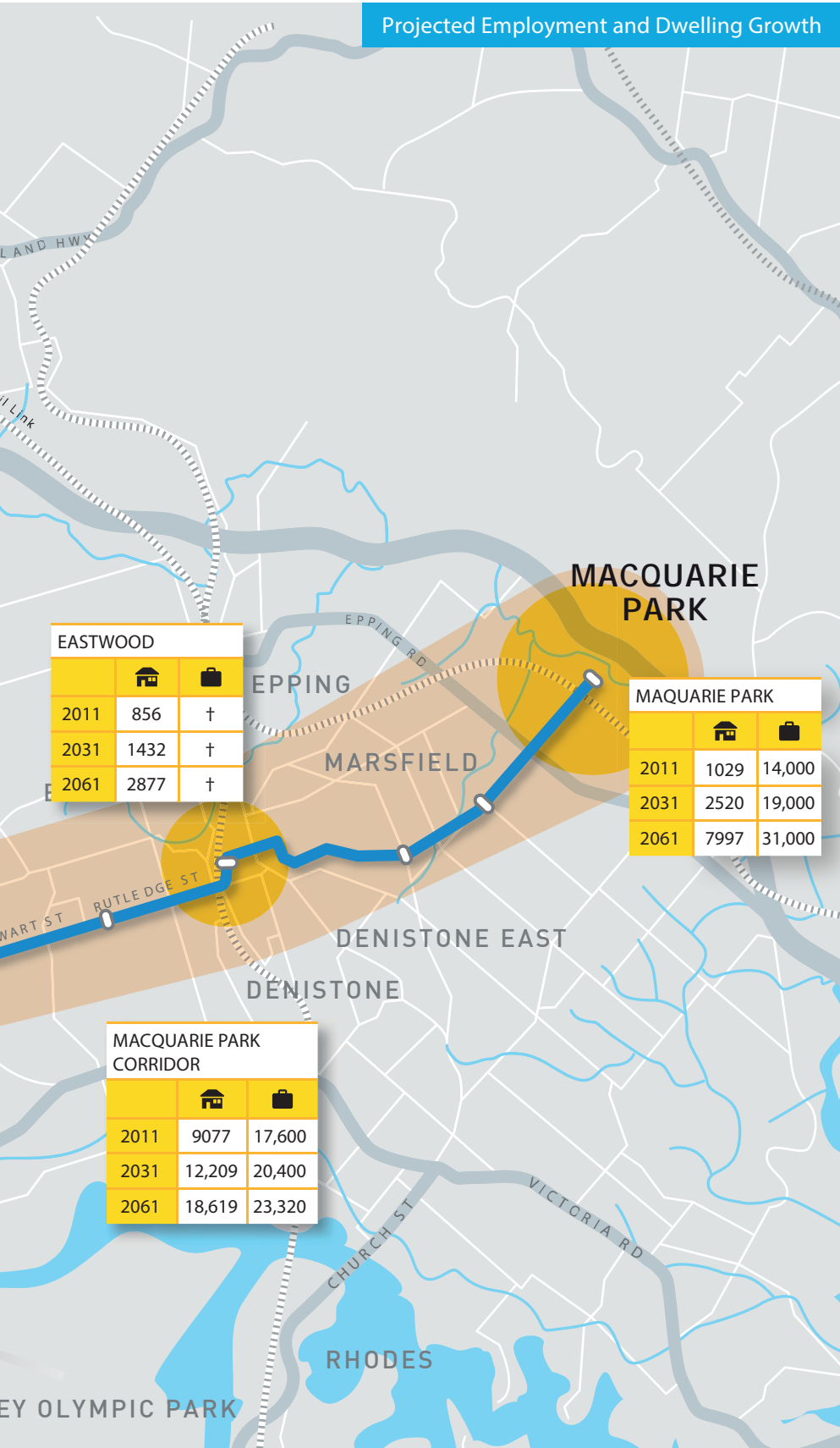
**PARRAMATTA**

	House	Briefcase
2011	1501	41,200
2031	3353	70,000
2061	6640	143,400

**RYDALMERE**

	House	Briefcase
2011	297	3400
2031	649	4400
2061	1803	6300

## Projected Employment and Dwelling Growth



## Growth and Renewal

The first two lines of the Western Sydney Light Rail Network will generate significant potential for new jobs and dwellings, above the current Bureau of Transport Statistics forecast. It will support greater diversity, integration of land uses and design quality. The majority of the growth will be focused on consolidating existing centres and intensification along the immediate light rail corridor.

## Potential Growth

- > Further growth of Eastwood
- > New knowledge precinct at Rydalmere
- > Renewal of Westmead and Carlingford Line Corridor
- > Renewal of Parramatta CBD and growth to the north of the CBD
- > Renewal of Cumberland Hospital site
- > Diversification of Castle Hill Trading Zone
- > Infill development in existing residential areas

## Employment Forecast \*

2011	123,400
2031	180,100
2061	301,760

## Dwelling Forecast \*

2011	32,723
2031	48,366
2061	84,809

\* Based on 2011 Bureau of Transport Statistics  
† Growth included within corridor growth



# PRECINCT URBAN RENEWAL

The Western Sydney Light Rail Network will drive development and renewal in key centres.

The images illustrate the scale and extent of new development possible around a light rail stop. The example shown here is Albert St North Parramatta which will experience growth in both residential and commercial property.

Several existing new residential and mixed use buildings are well suited to supporting a future light rail along Church Street.

The cross section demonstrates how the light rail will use the space at ground level integrating with pedestrians, traffic and buildings.





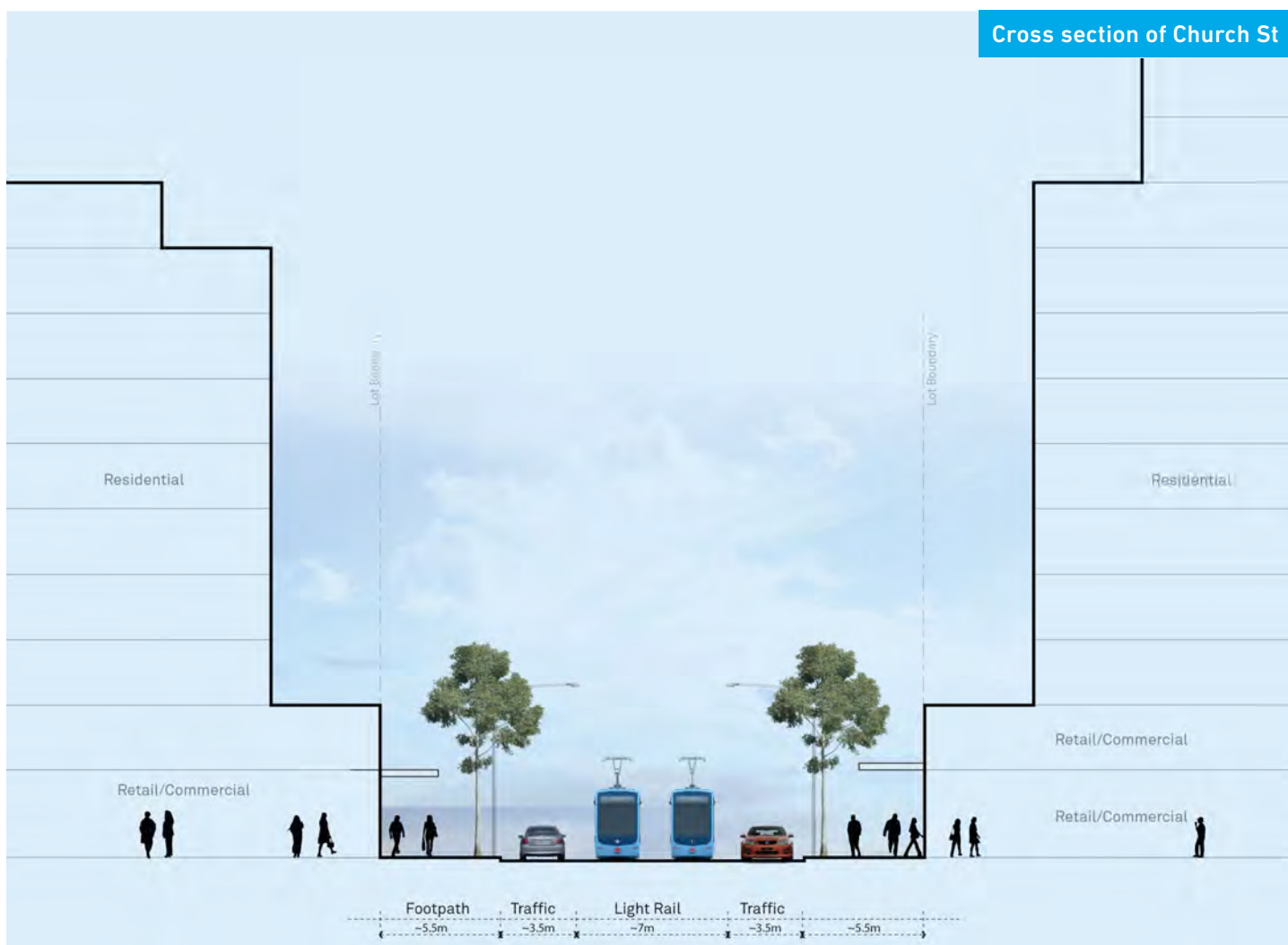
Existing



Under construction



Cross section of Church St



# COSTS AND STAGING

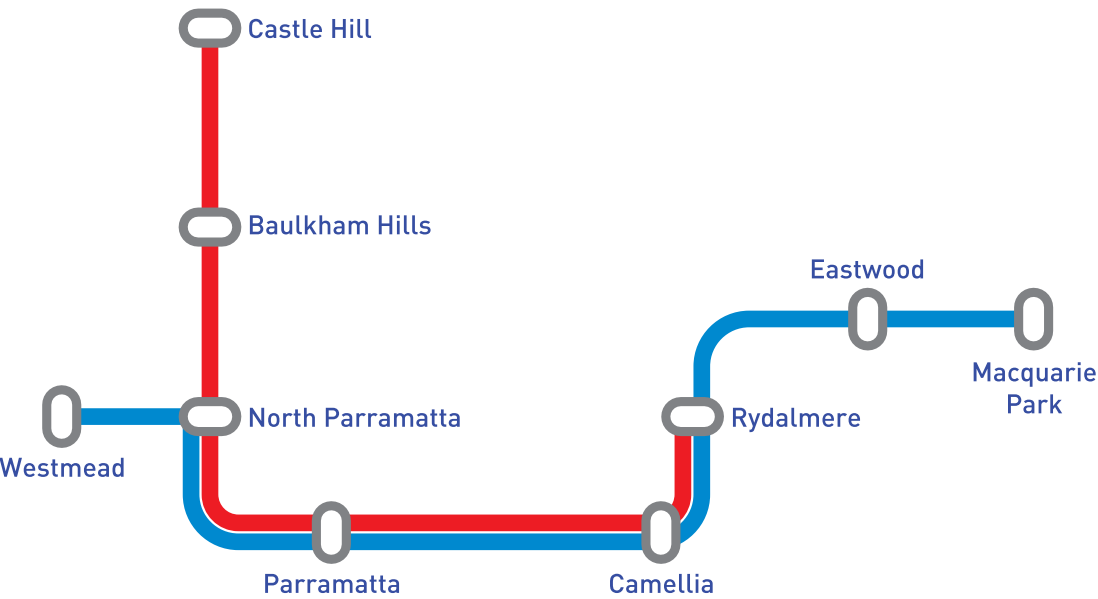
The initial estimate for the first two lines was \$1.7b. The cost has been refined (see table) and includes more detailed elements identified during the engineering feasibility assessment as well as light rail vehicles and a depot/operations centre. The revised cost estimate is \$1.525b.

It is recommended that the Macquarie Park Line be constructed before the Castle Hill Line. This spreads the investment cost and establishes revenue, patronage and operations.

Both lines serve Parramatta CBD and the University of Western Sydney, however the Macquarie Park Line additionally serves Westmead, Eastwood and Macquarie Park (university, business parks and large shopping centre).

In comparison the Castle Hill Line serves Northmead, Baulkham Hills and Castle Hill (large shopping centre and Trading Zone). It is predicted that further patronage work will demonstrate the Macquarie Park Line has higher patronage than the initially estimated when student trips, and trips to Westmead are considered.

The proposed service pattern for the Macquarie Park and Castle Hill Lines is shown below. It is suggested that both have a service frequency of 10 minutes in the peak and 15 minutes at other times. The overlap of services within Greater Parramatta doubles the frequency to a service every 5 minutes.



	Length (km)	Light Rail Vehicles (No.)	Estimated Cost (\$M)
<b>Macquarie Park Line</b> Westmead to Macquarie Park	17 km	10	\$ 919
<b>Castle Hill Line</b> North Parramatta to Castle Hill	13 km	11	\$ 606
<b>TOTAL</b>	30 km	21	\$ 1525

# NEXT STEPS

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Part 2 of the Feasibility Study concludes Parramatta City Council's \$1 m investigation of the Western Sydney Light Rail Network.

Council is calling on both the State and Federal Governments to fund a detailed study to further investigate the Western Sydney light rail network and the preparation of a business case for the first stage.

The recommended next steps:

- > Community consultation and engagement
- > Identification and implementation of short term options for strengthening public transport on the preferred alignments
- > Refinement of patronage modelling and expand to include all trips
- > Road network analysis
- > Public transport network analysis
- > Detailed cost estimation
- > Funding sources and models for both capital and operation
- > Detailed engineering feasibility
- > Utilities investigations
- > Planning controls
- > Land use development capacity
- > Alignment, stop and depot site finalisation
- > Future extension including the Bankstown Line and the Olympic Park Line

Council, with its key and regional partners, will continue to advocate for the further development of this scheme with all levels of government, businesses and community to delivery better connectivity to the future generation of Western Sydney.



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